DIVISION OF RESEARCH SERVICES

Research Projects

FY 1987

VRB Research Project (Z01 RS)

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER
Z01 RS 00001-17 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)
Animal Model Development

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

PI: Carl T. Hansen Geneticist SAS, VRB, DRS

COOPERATING UNITS (if any)

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER
1.0	1.0	0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

The objective of this program is developing new models for biomedical research utilizing the natural genetic variation found in sexually reproducing small research animals. The emphasis has been with certain mutants which are known to affect the functioning of the immune system, metabolic and neurological systems in rats and mice. The strategy has been to establish these mutants on different genetic backgrounds as well as making different combinations of independently appearing mutants. The result has been the formation of a unique resource of animal models which is gradually finding increasing acceptance by the research community.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00002-16 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*
Development of Diets for Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Joseph Knapka	Physiologist	SAS, VRB, DRS
	Dennis Barnard	Biologist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.35	0.25	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A continuing program in laboratory animal nutrition involves studies with the species that are most frequently used as animal models in biomedical research. The objective of the program is to improve the nutritional status of NIH production and research colonies of rats, mice, guinea pigs, rabbits, dogs, cats and various species of non-human primates. A series of factorially-designed feeding trials are used to ascertain the nutrient requirements of the species of interest and to develop diets with more nearly optimal nutrient concentrations for their growth, reproduction, maintenance or general health status. This program has resulted in the development of a series of open formula natural ingredient diets that are not only used in animal colonies at NIH, but also in research animal colonies throughout its biomedical research community.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

ZO1 RS 00051-07 VR

PERIOD COVERED
October 1, 1987 to September 30, 1988

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)
Reproduction in Mutant Sheep Used for the Study of Hyperbilirubinemia

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator. Name, title, laboratory, and institute affiliation.

PI:	L.D. Stuart	Chief	UU, ACS, VRB, DRS
Others:	D.E. Wildt	Reproductive Physiologist	NZP, Smithsonian Institution
	S.C. Kalser	Director	Liver Diseases Prog., DDN, NIAID
	P.K. Chakraborty	Head	Research Division, Dept. of OB-GYN USUHS

COOPERATING UNITS (if any)
Digestive Diseases and Nutrition Program, National Institutes of Arthritis, Metabolism and Digestive Diseases

LAB/BRANCH
Veterinary Resources Branch

SECTION
Animal Center Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.1	.1

CHECK APPROPRIATE BOX(ES)

[ ] (a) Human subjects [ ] (b) Human tissues [X] (c) Neither

[ ] (a1) Minors

[ ] (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

A specific genetic strain of Corriedale sheep is used as an animal model for the study of liver pathophysiology, specifically, hyperbilirubinemia (Dubin-Johnson Syndrome). This project is concerned with increasing the numbers of animals available for research by the controlled breeding of individuals which genetically transmit this character. This project is utilizing what is considered to be the only existing Corriedale sheep homozygotic for this trait. Efforts are being made to obtain both homozygous and heterozygous offspring from these highly inbred individuals. Semen collected artificially from the homozygotic rams was diluted in various cryoprotective extenders and then freeze preserved. This will ensure the long-term availability of male gametes for artificial insemination. Overall this project allows perpetuation of this specific gene pool and ensures availability of research animals for future investigations of Dubin-Johnson Syndrome and related metabolic disorders.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00070-03 VR

PERIOD COVERED

August 1, 1987 to August 1, 1988

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Effect of Tocainide HCl Pretreatment of Surface-Induced Cardiac Hypothermia

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	M. April	Chief	PU, ACS, VRB, DRS
Others:	J. C. Keith	Assoc. Prof.	VMRCVM (VA-MD Reg. Col. Vet. Med.)
	P. Ruggera	Prod. Engineer	FDA, Center for Devices & Rad. Health
	J. Gainer	Assist. Br. Chief	FDA, Center for Veterinary Medicine
	K. Roberts	Assist. Prof.	VMRCVM (VA-MD Reg. Col. Vet. Med.)
	G. Kantor	Chief	FDA, Ctr. for Devices & Rad. Health

COOPERATING UNITS *(if any)*

Food and Drug Administration, Centers for Veterinary Medicine, and Devices and Radiological Health; and VA-MD Regional College of Veterinary Medicine

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.037	0.025	0.012

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Studies with the beagle dog as the animal model were conducted on the initial phase of the project to ascertain the myocardial cytoprotective effects and antiarrhythemic effects of the drug (tocainide HCl); and the rapid rewarming effects produced by a radio-frequency (RF) helical coil. Hypothermic studies (using the beagle dogs) were also initiated to evaluate the effectiveness and safety of the RF coil. The coil proved to be effective and safe with the first five dogs. The heart muscle biopsies are being evaluated by election microscopy. Tocainide's antiarrhythermic effect was excellent as viewed clinically and by B.P. and E.C.G. recordings. The second phase of the project using five more beagles to represent control animals will be done. The project description and research methodology will remain the same.

GPO 914-918

SMITHSONIAN SCIENCE INFORMATION EXCHANGE PROJECT NUMBER (Do NOT use this space)	U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLIC HEALTH SERVICE NOTICE OF INTRAMURAL RESEARCH PROJECT	PROJECT NUMBER Z01 RS 00071-03 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT (80 characters or less)

Development of Genetic Profiles for Inbred Laboratory Rodents

NAMES, LABORATORY AND INSTITUTE AFFILIATIONS, AND TITLES OF PRINCIPAL INVESTIGATORS AND ALL OTHER PROFESSIONAL PERSONNEL ENGAGED ON THE PROJECT

J.S. Crowell, Geneticist — Comparative Pathology Section, VRB, DRS
S.L. Finley, Biochemist — Comparative Pathology ection, VRB, DRS

COOPERATING UNITS (if any)

Small Animal Section, VRB, DRS

LAB/BRANCH
Veterinary Resources Branch

SECTION
Comparative Pathology Section

INSTITUTE AND LOCATION
Division of Research Services, Bethesda, Maryland 20892

TOTAL MANYEARS:	PROFESSIONAL:	OTHER:
0.5	0.4	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) HUMAN SUBJECTS ☐ (b) HUMAN TISSUES ☑ (c) NEITHER

☐ (a1) MINORS ☐ (a2) INTERVIEWS

SUMMARY OF WORK (200 words or less - underline keywords)

This project is designed to identify and locate on the chromosomes of inbred rodents inherited characteristics which can be used in a wide range of biomedical research and to further the ability of the Genetic Monitoring Unit to perform its basic mission. The major areas of interest are: 1) characterization of the genetic traits by biochemical and immunological techniques; 2) chromosome mapping by standard genetic analysis; and 3) application of the genetic characteristics to explore new animal models of pathogenesis.

SMITHSONIAN SCIENCE INFORMATION EXCHANGE PROJECT NUMBER (Do NOT use this space)	U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES PUBLIC HEALTH SERVICE NOTICE OF INTRAMURAL RESEARCH PROJECT	PROJECT NUMBER Z01 RS 00072-03 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT (80 characters or less)

Pathogenesis of cilia-associated respiratory (CAR) bacillus infections

NAMES, LABORATORY AND INSTITUTE AFFILIATIONS, AND TITLES OF PRINCIPAL INVESTIGATORS AND ALL OTHER PROFESSIONAL PERSONNEL ENGAGED ON THE PROJECT

K.S. Waggie, D.V.M.,Ph.D	Comparative Pathology Section, VRB, DRS
A.M. Allen, D.V.M., Ph.D.	Comparative Pathology Section, VRB, DRS
T.H. Spencer, B.S.	Comparative Pathology Section, VRB, DRS

COOPERATING UNITS (if any)

LAB/BRANCH
Veterinary Resources Branch

SECTION
Comparative Pathology Section

INSTITUTE AND LOCATION
Division of Research Services, Bethesda, Maryland 20892

TOTAL MANYEARS:	PROFESSIONAL:	OTHER:
0.3	0.1	0.2

CHECK APPROPRIATE BOX(ES)

☐ (a) HUMAN SUBJECTS ☐ (b) HUMAN TISSUES ☒ (c) NEITHER

☐ (a1) MINORS ☐ (a2) INTERVIEWS

SUMMARY OF WORK (200 words or less - underline keywords)

The cilia-associated respiratory (CAR) bacillus was first demonstrated with silver stains of sections of the respiratory tract of rats by workers in the Netherlands. It was isolated in embryonated hen eggs by the staff of Comparative Pathology Section (Inf. and Immun., Feb. 1985) as a result of efforts to diagnose and characterize chronic respiratory disease in rats from an investigator's lab at NIH. To gliding, flexing motion, in the absence of evidence of means of locomotion, it is believed to be a member of the group of gliding bacteria. Preliminary pathology studies indicate that infections in rats and possibly rabbits result in chronic respiratory disease.

PHS-6040
(Rev. 2-81)

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00073-03 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Lipid Metabolism of the Macaca fascicularis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Dennis Barnard	Biologist	SAS, VRB, DRS
	Joseph Knapka	Physiologist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.6	0.1	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The study will examine the metabolism of exogenous fatty acids by Macaca fascicularis. Trans fatty acids which cannot be synthesized by eukaryotes will be used as the exogenous fatty acid marker. These fatty acids are geometrical isomers of cis fatty acids which can be synthesized by eukaryotes. The trans fatty acids are catabolized and removed from the body shortly after the fatty acids are removed from the diet. Twelve male M. fascicularis monkeys were used in the study. Six were fed the control diet, and the others received the experimental diet. The RBC membrane of monkeys fed the control diet contained .5% trans octadecanoate isomers of the fatty acids. Examination of the fecal fatty acids from these monkeys showed that biohydrogenation does occur in their gut producing trans fatty acids which appear to be incorporated into the RBC membrane. Within 6 weeks after initiating the study the RBC membranes of monkeys fed the experimental diet contained 10.8% trans octadecanoate isomers of the total fatty acids. Corresponding with the increase in trans fatty acids there was an increase in the membrane linoleate to arachidonate ratio. This indicated that trans fatty acids interfere with arachidonate synthesis. There was also a displacement of saturated fatty acids and cis octadecanoate isomers. The double bond index was calculated and indicated that the observed perturbations in the fatty acid content of the RBC membranes from monkeys fed the experimental diet resulted in decreased membrane fluidity.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00077-03 VR

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of an Embryo Cryopreservation Program in Laboratory Animals

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Patricia Schmidt	Physiologist	SAS, VRB, DRS
	Carl Hansen	Geneticist	SAS, VRB, DRS
	David Wildt	Guest Researcher	VRB, DRS
	Mitchel Schiewe	Guest Researcher	VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Small Animal Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 208922

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.3	1.3	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The program objective is to facilitate the management of the NIH Animal Genetic Resource (NIHAGR) through development and utilization of embryo collection, culture, freezing and transfer as techniques for cryobanking genetic material and improving reproductive potential. The NIHAGR maintains a number of critical species and, within species, a vast number of invaluable genotypes used in biomedical research. A cryoprotectant in the freezing medium allows sufficient dehydration to protect the blastomeres during freezing. Following thawing and dilution of the cryoprotectant, embryos are cultured to assess in vitro development. Transplantation of embryos into recipient females monitors in vito development and thus biological competence. In vitro fertilization and ova freezing are being examined as techniques to salvage limited genetic material from single females or strains with poor in vivo fertilization rates. Banked embryos are maintained in a frozen state until needed for rederivation. A primary focus of laboratory efforts is the study and optimization of cryobanking technology in mice. A major research finding is that embryo freezability is confounded and influenced markedly by genotype. Such responses have been examined in over 49 mouse genotypes, most of which display genotype-specific survival rates to standardized embryo freeze-thawing procedures. Ancillary projects are oriented toward the comparative aspects of improving long-term embryo storage with particular emphasis on the study of cryoprotectants and enhancing methods for embryo freezing, thawing, dilution and transfer.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00078-02 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Serum Cholesterol Values of the NIH WHHL Rabbit

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	Dennis Barnard	Biologist	SAS, VRB, DRS
	Cheri Reid-Quinn	Veterinarian	SAS, VRB, DRS
	William Watson	Veterinarian	SAS, VRB, DRS
	Joseph Knapka	Physiologist	SAS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER
1.0	0.5	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The Veterinary Resources Branch, Division of Research Services established a Watanabe Hyperlipidemic Rabbit (WHHL) breeding colony to be used as a resource for investigators requiring the use of this animal model. The colony is being characterized for serum total cholesterol, cholesterol levels of the lipoprotein fractions and serum triglyceride levels. Blood is being collected from rabbits at the following ages: six weeks, three months, seven months, and one year. Total serum cholesterol values ranged from 310 to 1251 mg/dl with a mean of 828 mg/dl. The low density lipoprotein (LDL) cholesterol values ranges from 1185 mg/dl with a mean of 630 mg/dl. Thus 80% of the total cholesterol was composed of LDL cholesterol. There was a substantial decrease from 885 to 576 mg/dl in serum total cholesterol between the ages of eight weeks and one year. The most significant decrease occurred between the ages of 15 to 25 weeks. There was no difference in total cholesterol concentrations due to sex. The serum triglyceride values ranged from 107 to 959 mg/dl with a mean of 394 mg/dl. There was an initial increase in triglyceride concentration from 367 to 565 mg/dl between two months and three months of age. However, the serum triglyceride concentration decreased to 349 mg/dl within one year of age. The serum triglyceride concentration was influenced by the sex of the rabbit. The mean male and female serum triglyceride concentrations were 510 mg/dl and 309 mg/dl respectively.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00079-01 VR

PERIOD COVERED
October 1, 1986 to September 30, 1987

TITLE OF PROJECT (80 characters or less. Title must fit on one line between the borders.)
Histological Profile of the Watanabe Heritable Hyperlipidemic (WHHL) Rabbit

PRINCIPAL INVESTIGATOR (List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)

PI:	Cheri Reid-Quinn	Veterinary Medical Officer	SAS, VRB, DRS
	William T. Watson	Chief, SAS	SAS, VRB, DRS

COOPERATING UNITS (if any)

LAB/BRANCH
Veterinary Resources Branch

SECTION
Small Animal Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER
1.5	1.5	0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK (Use standard unreduced type. Do not exceed the space provided.)

Watanabe heritable hyperlipidemic (WHHL) rabbits are being examined for evidence of histologic lesions of atherosclerosis. Four age groups are being examined for comparison of lesions at various ages. In each of the four age groups the age at which lesions are first discernible and variations in severity of lesions is examined and categorized. Rabbits of both sexes are being used to determine if any sex differences are present in degree of severity of lesions and age of onset. The serum cholestrol and tryglyceride values are examined also for possible correlation with lesions.

The significance of this project lies in the identification of factors relating various serum cholesterol/tryglyceride values with atherosclerotic lesions. By associating lesions with serum values, a profile of the WHHL rabbit will be established.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 00080-01 VR

PERIOD COVERED

April 12, 1987 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Effects of Progesterone on CEH in the SLA Inbred Miniature Pig

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	K.J. Lipetz	Director of Laboratories	Montgomery Infertility Institute
Others:	L.D. Stuart	Chief	UU, ACS, VRB, DRS
	D.M. Matthews	Chief	CMU, VMSS, VRB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Veterinary Resources Branch

SECTION

Animal Center Section

INSTITUTE AND LOCATION

DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS	PROFESSIONAL	OTHER
.05	.025	.025

CHECK APPROPRIATE BOX(ES)

[ ] (a) Human subjects [ ] (b) Human tissues [X] (c) Neither

[ ] (a1) Minors

[ ] (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The SLA inbred miniature pig herd, bred and maintained by the Ungulate Unit for the Immunology Branch, NCI typically produces a small litter and exhibits a variety of reproductive problems not found in the standard-sized pig. A uterine condition, cystic endometrial hyperplasia (CEH), exists in the herd and is directly involved in reducing the reproductive efficiency of the herd. Sows that are not bred until after one year of age have a high incidence of CEH and are incapable of reproduction. Regression or reduction of the incidence of CEH would improve greatly the reproductive performance of the herd. Previous studies have showed the SLA inbred miniature pig has a serum progesterone level considerably lower than the standard-sized pig. The effects of long term administration of progesterone on CEH will be studied.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 00081-01 VR

PERIOD COVERED
June 15, 1987 to May 15, 1988

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Control of Luteal Function and Induction of Ovulation and Conception in the Anestrus Bitch

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P. K. Chakraborty	Head, Research Division Obstetrics & Gynecology	USUHS
Others:	R. L. Killens	Chief, Carnivore Unit	ACS/VRB/DRS
	J. L. Brown	Research Associate Obstetrics & Gynecology	USUHS

COOPERATING UNITS *(if any)*
Carnivore Unit, ACS, VRB, DRS; Research Division, Department of Obstetrics and Gynecology, USUHS.

LAB/BRANCH
Veterinary Resources Branch

SECTION
Animal Center Section

INSTITUTE AND LOCATION
DRS, NIH, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER
.6	.4	.2

CHECK APPROPRIATE BOX(ES)
☐ (a) Human subjects ☐ (b) Human tissues ☑ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project is designed to study the effect of two treatment regimens using hormone stimulants to induce ovulation and conception in bitches. The major areas of interest are: 1) the induction of regression of the functional corpora lutea by hormone administration; and 2) the induction of follicular development and ovulation followed by breeding bitches pretreated with hormone to regress corpora lutea.

BEIB RESEARCH PROJECTS (Z01 RS)

TABLE OF CONTENTS (Cont'd)

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10001-19 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Pharmacokinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Dedrick	Chief, CHES	BEIB	DRS
Others:			
F.Farris	Southeastern Coll. of Pharm. Sci.		
F.King	North Carolina A&T Univ.		
R.J. Lutz	Chemical Engineer	BEIB	DRS
P.F. Morrison	Physical Scientist	BEIB	DRS

COOPERATING UNITS *(if any)*

CPB, NCI (J.M. Collins); DR-CC (J.L. Doppman); NTP-NIEHS (H.B. Matthews); SNB-NINCDS (E.H. Oldfield); University of Maryland (M.Egorin).

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Pharmacokinetic models are developed for the distribution and disposition of drugs, environmental contaminants, and endogenous metabolites in animals and humans. They provide a plausible set of equations that can be used to extrapolate data from animals to humans and thereby improve chemotherapy and risk assessment. Consideration of regional drug delivery has continued with emphasis on intra-arterial and intracavitary administration. This has led to spatially-distributed descriptions of the processes. On theoretical bases, depth of penetration of drugs into tissue adjacent to cavities can vary considerably, depending on the intratissue diffusivity, capillary permeability-area product and rate of irreversible reaction with tissue. Drug streaming from arterial catheters appears to be a frequent problem leading to nonuniform distribution of drug in the infused tissue and compromising studies of toxicity and therapeutic effect. Work is in progress on the development of a physiological pharmacokinetic model for methyl mercury and inorganic mercury in the rat. Work is also in progress on the adaptation of a pharmacokinetic model for cis-diamminedichloroplatinum(II) to other platinum-containing complexes.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: ZO1 RS 10002-22 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Implant Device Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John W. Boretos	Physical Scientist	BEIB DRS
John Doppman, M.D.	Radiologist	CR, CC
Edward Oldfield, M.D.	Neurosurgeon	NINCDS
F.T. Hambrecht, M.D.	Health Science Adm.	NINCDS
Richard Clark, M.D.	Heart Surgeon	NHLBI

COOPERATING UNITS *(if any)*

CR, CC, NIH; NS, NINCDS, NIH
FNP, NINCDS, NIH; S, NHLBI, NIH
BEIB, DRS, NIH.

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering

INSTITUTE AND LOCATION

DRS, NIH Bethesda, MD. 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.7	0.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to study the interaction between biomaterials and the physiological environment and to determine the suitability of specially-prepared biomaterials for use in various contexts. Polymers, metals and ceramics are important for use in catheters, heart-assist pumps, electrode insulation and similar implant applications. Variations in these materials as well as physically induced stress and environmentally accelerated degradation can severely reduce their effectiveness for long-term use as surgical devices. Previous studies undertaken by this project have shown a relationship between the molecular chain structure and resistance to hydrolysis. Recent evidence suggests that physical forces such as stress induced during fabrication can promote a form of stress corrosion. *In vitro* test data and SEM photomicrographs of surgical explants of various polyurethane classes show that premature failure is often the result of a combination of forces acting on the polymer at stress risers. Polymer systems and composites capable of time dissolution offer significant advantages in the development of devices that allow natural tissues to take over as healing

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10015-12 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Development of Everting (Toposcopic) Catheter for Clinical Vascular Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.)* *(Name, title, laboratory, and institute affiliation)*

PI: D.R. Shook	Biomedical Engineer	BEIB	DRS
J.L. Doppman	Chief	DR	CC
E.H. Oldfield	Chief (Acting)	SNB	NINCDS
D.L. Miller	Radiologist	DRS	CC
H.R. Keisar	Clinical Director	DIR	NHLBI

COOPERATING UNITS *(if any)*

Diagnostic Radiology, CC (J.L. Doppman, D. Miller);
Surgical Neurology, NINCDS (E.H. Oldfield)

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The everting catheter has been shown to be a reliable clinical means to catheterize long, small diameter, and highly tortuous blood vessels, inaccessible by previous techniques. An everting element evaginates from the tip of a conventional catheter. This extremely flexible polyurethane element has been fabricated in 3, 4 and 5 French sizes, mated with 5, 6 and 7 French catheters, respectively, and is capable of eversion lengths in excess of 40 cm.

The catheter has been applied clinically for the local delivery of drugs to brain tumors and embolizing agents to the liver. In the former, treatment is provided by positioning the conventional catheter in the internal carotid artery from a femoral entry, everting the element through the carotid sinus (beyond the ophthalmic artery to avoid retinal toxicity) and perfusing the tumor through the middle and/or anterior cerebral

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10034-10 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Three-Dimensional Histological Reconstruction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S.B. Leighton	Mechanical Engineer	BEIB	DRS
A.M. Kuzirian	Neuroanatomist	LB	NINCDS

COOPERATING UNITS *(if any)*

LB NINCDS

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.2	.2	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A semi-automatic system for acquiring three-dimensional structural information about histological material is being developed. The system should be faster and more reliable than techniques that use serial sections, although resolution may be limited. In brief, an embedded tissue block will be fixed relative to a scanning electron microscope imaging system, the surface of the block will be imaged and the image stored, and successive slices will be removed by a built-in microtome. Handling and registration of thin sections will thus be eliminated. Human and computer pattern recognition will transform the resulting set of images into a three-dimensional reconstruction. Oxygen plasma etching has been found to give sufficient topographic relief that the resolution of the images is now limited by the SEM and not by the preparation technique. The images of Hermissenda Crassicornis obtained by this technique correlate well with TEM images of the same tissue.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10039-10 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Biophysical Instrumentation and Methodology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis	Research Chemist	BEIB	DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Microanalysis

INSTITUTE AND LOCATION

DRS, National Institutes of Health, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The project is designed to develop new instrumentation and methods (or to improve existing ones) for characterization of biological macromolecules and for study of their interactions. Analytical ultracentrifugation, the techniques ancillary to it, and methods of data analysis using mathematical modeling appropriate for these techniques are the major areas of interest.

Major emphasis in this project has been given to applications of mathematical modeling to problems in ultracentrifugal analysis. This principal of concern has been to extend the method of implicit constraints to a wider range of studies of macromolecular interactions and in particular analyzing combined homogeneous and heterogeneous associations. MLAB software, operating on the DEC-10 computer, has been used for the mathematical modeling. The applications of these studies are described in the project report 10184-04, Physical Chemistry of Biological Macromolecules.

A feasibility study continues toward development of a low-cost optical data acquisition system (based upon fluorescence scanning) that would convert existing preparative ultracentrifuges into analytical ultracentrifuges.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10043-10 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Fiber Optic Probes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John I. Peterson	Chemist	BEIB, DRS
Einar Stefansson		EICB

COOPERATING UNITS *(if any)*

RVR

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.8	.8	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A suitable device is needed for the direct measurement of oxygen partial pressure (pO_2) in blood and tissue for both clinical and research applications. Methods currently available for measuring pO_2 lack convenience, reliability, speed, and applicability to many situations of interest. Efforts to develop electrical sensors have not been successful. It is desirable to have a very small pO_2 sensor which can be inserted into a blood vessel or tissue with little disturbance, that will provide instantaneous pO_2 monitoring for either short or extended periods of time. A fiber-optic sensor is ideal for this application, with the advantage, for physiological use, of very small size and flexibility, safety, and low cost. A pO_2 sensor has been developed, based upon the principle of fluorescence quenching by oxygen. The feasibility of the sensor and its satisfactory performance have been demonstrated in *in vitro* and *in vivo* tests in preceding years. The development of the sensor as a needle probe has been accomplished.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10096-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Light Scattering Method for Evaluation of Platelets

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.F. Bonner	Physicist	BEIB, DRS
T.R. Clem	Elect. Engineer	BEIB, DRS
S.B. Leighton	Mech. Engineer	BEIB, DRS
J. Fratatoni	Section Chief	DBBP, CDB, FDA
B. Poindexter	Biologist	BBPB, DBBP, CDB, FDA
P. Mintz	Director	Blood Bank, U.V.A
G. Anderson	Researcher	Blood Bank, U.V.A

COOPERATING UNITS *(if any)*

Center for Drugs and Biologics, FDA
Blood Bank, U. Virginia

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

In the preceding years of this project we have developed a unique instrument to assess noninvasively the concentration and morphology of transfusion platelets via a rapid, clinically acceptable procedure. The basis of this measurement is low-angle multiple scattering of light and the changes in this signal associated with orientation of the subset of the platelet population that is discoid. The instrument, under microprocessor control, calculates the concentration and percentage of platelets that are discoid within a transfusion bag. This requires fewer than three minutes. These measurements are being used in a variety of research studies of the effects of various storage conditions (e.g., temperature transients, bag wall material, addition of pharmacological agents) on the condition of stored platelet concentrates. The instrument was originally designed to play a role in improving the quality of platelet transfusions, by routine and accurate noninvasive assessment of platelet quality (as represented by the degree of normal platelet morphology). To this purpose ongoing studies at the Univ. of VA Medical School Blood Bank are directed at determining the degree of correlation between the noninvasive measurement and clinical efficacy of the platelet transfusion.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS-10097-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Studies in Cardiovascular Dynamics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick	Head, Theor. Biomech. Group	BEIB, DRS
J.C. Ohayon	Visiting Fellow	BEIB, DRS
C. Oddou	Professor	U. of Paris
P. Brun	Senior Researcher	INSERM U. 138
B. Levy	Senior Researcher	INSERM U. 141

COOPERATING UNITS *(if any)*

INSERM U.138 U.141
University of Paris XII, Laboratory of Physical Mechanics

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.9	1.9.	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

We have refined our existing model for myocardial and ventricular mechanics to include the effects of collagen on the elasticity of the myocardium, non-cylindrical geometry, pathological fiber organization, myocardial blood flow, myocardial oxygen demand, and effects of electrical activation patterns. The model was used in conjunction with ultrasonic kinematic data, gated radionuclide ventriculography, and left heart catheterization data to determine performance parameters. The physiological relationships between phasic coronary arterial and venous pressure and blood flow, aortic input impedance and ventricular dimensions will be determined. A mathematical and physical model of myocardial blood flow will be developed incorporating vessel collapse. Experimental techniques will be developed to measure vascular distensibility in man. RF backscatter from the myocardium will be investigated both experimentally and mathematically with the idea of determining the stress field.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10098-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Laser Instrumentation for Vitreous & Cardiovascular Microsurgery

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.F. Bonner	Physicist	BEIB	DRS
P.D. Smith	Physicist	BEIB	DRS
M. Leon	Sr. Investigator	CB	NHLBI
S. Epstein	Chief	CB	NHLBI
D. Lu	Fellow	CB	NHLBI
L. Prevosti	Guest Fellow	CB	NHLBI
R. Clark	Chief	SB	NHLBI
C. Kupfer	Director		NEI

COOPERATING UNITS *(if any)*

Clinical Branch, NEI; Optical Science Branch, Naval Research Lab
Cardiology Branch and Surgery Branch, NHLBI; Quantroni Corp.;
Infrared Fiber Systems

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5		2.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This program covers the long-standing development of laser microsurgical techniques that initially centered on ophthalmological applications and systems of interest in that field (pulsed carbon dioxide lasers and pulsed ND:YAG slit lamp-based laser systems). Its primary focus for the last 3 years has been in cardiological application of lasers, in particular laser angioplasty. In order to develop new laser microsurgical techniques in this new field, it was necessary to analyze a variety of laser sources and their tissue effects and the feasibility of transmission through flexible fiber optics. New sources such as Erbium:YAG (YLF) lasers coupled to zirconium fluoride optical fibers and excimer lasers coupled to fused silica fibers were examined, as well as more conventional sources (pulsed carbon dioxide and Nd:YAG lasers and continuous-wave argon and dye lasers).

In collaboration with the Naval Research Lab, we have developed the new erbium laser microsurgery technology, beginning with feasibility studies and proceeding to development of a microsurgical prototype using zirconium fluoride fibers. Refinement of this system is primarily directed towards intravascular ablation (laser angioplasty), but includes applications to intraocular surgery (particularly to vitreal membranes, trabeculotomy, cataract surgery and corneal transplantation), destruction of renal stones, and endoscopic

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10099-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Cochlear Mechanics and Hair Cell Transduction

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S Chadwick	Head, Theor. Biomec Group	BEIB	DRS
J. Rinzel	Chief	MRB	NIADDK
S. Shamma	Assist. Prof.,U. of MD, Dept. of Elec. Engineer		

COOPERATING UNITS *(if any)*

NIADDK, Mathematical Research Branch
Univ. of Maryland, Dept. of Electrical Engineering

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.05	0.05	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A mathematical model of cochlear processing is developed to account for the nonlinear dependence of frequency selectivity on intensity in inner hair cell and auditory nerve fiber responses. The model describes the transformation from acoustic stimuli to intracellular hair cell potentials in the cochlea. It incorporates a linear formulation of basilar membrane mechanics and subtectorial fluid-cilia displacement coupling, and a simplified description of the inner hair cell nonlinear transduction process. The analysis at this stage is restricted to relatively low frequency single tones. The computed responses to single tone inputs exhibit the experimentally-observed nonlinear effects of increasing intensity such as the increase in the bandwidth of frequency selectivity and the downward shift of the best frequency. In the model the first effect is primarily due to the saturating effect of hair cell nonlinearity. The second results from the combined effects of both the nonlinearity and the inner hair cell lowpass transfer function. In contrast to these shifts along the frequency axis, the model does not exhibit intensity dependent shifts of the spatial location along the cochlea of the peak response for a given single tone. The observed shifts, therefore, do not contradict an intensity-invariant tonotopic code.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10103-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Triple-Laser, Multi-Parameter Flow-Cytometry System for Study of Tumor Cell Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette	Chief, ACES,BEIB	DRS
S. Shackney	Allegheny Gen. Hosp. Pittsburgh, PA	
J. Dvorak	LPD	NIAID
F. Plowman	ACES,BEIB,	DRS

COOPERATING UNITS *(if any)*

DRS-NCI
LPD-NIAID

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A triple-laser flow cytometer has been developed so that various immuno-fluorescent labeling techniques may be employed for the investigation of cell kinetics. The electronics portion of the system has been redesigned to be compatible with an IBM AT personal computer. The new design was facilitated by first developing an analog flow-cytometry simulator, complete with computer hand shaking. This simulator was used extensively in the development of the new software for the system. Gating, ratio subtraction and logarithmic preprocessing are all done by the computer, greatly reducing the analog electronic pre-processing requirements. The high optical sensitivity of the basic system has permitted the flow cytometric analysis of the DNA synthetic cycle of Candida Species.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 10109-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Adjunctive Heat Treatment of Cancer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.L. Levin	Biomedical Engineer	BEIB	DRS
J-L Guerquin-Kern	Fogarty Fellow	BEIB	DRS
C. Charny	Guest Worker	BEIB	DRS
H. Coldefy	Fogarty Fellow	BEIB	DRS
E.J. Glatstein	Chief	ROB	NCI

COOPERATING UNITS *(if any)*

Radiation Oncology Branch, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.7	3.2.	.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to facilitate the development of adjunctive hyperthermia modalities for cancer treatment through theoretical and experimental studies of the spatial and temporal variation in the temperature field of tissues subjected to microwave and radio-frequency electromagnetic radiation. Currently, we are (1) measuring the patterns of energy deposition produced by a mini-annular phased array (MAPA) applicator within various types of extremity phantoms ; (2) describing the electromagnetic fields of a MAPA in terms of its design parameters; (3) describing the transient thermal profiles within limbs produced by a MAPA; and (4) describing the systemic temperature and cardiac changes associated with heating various regions of the body. We are also performing electromagnetic and thermal modeling of the unwanted non-local energy deposition occurring outside the bounds of typical hyperthermia applicators. These studies are forming the basis for the clinical system currently being tested.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10112-07 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Analysis of Microcirculatory Blood Flow by Laser Doppler Scattering

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.F. Bonner	Physicist	BEIB	DRS
T.R. Clem	Electrical Engineer	BEIB	DRS
M. Kaliner	Section Chief	LCI	NIAID
H. Wagner	Section Chief	LNNS	NINCDS
T. Delaney	Sr. Investigator	ROB	NCI
M. Roy	Visiting Scientist		NEI
D. Goldstein	Senior Investigator	HB	NHLBI
E. Oldfield	Neurosurgeon	SN	NINCDS

COOPERATING UNITS *(if any)*

HB, NHLBI; CB NEI; LCI, NIAID; ROB, NCI; SN, NINCDS; LAP, DCRT; MedPacific,Inc, Seattle,WA; TSI, Inc, St. Paul,MI; Neurology and Gastroenterology Depts., USUHS, Bethesda, MD; Dept. Medicine, Med. Coll. S. Carolina, Charleston, SC.

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

- ☒ (a) Human subjects
  - ☒ (a1) Minors
  - ☐ (a2) Interviews
- ☐ (b) Human tissues
- ☐ (c) Neither

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project has developed a clinically-useful method (laser Doppler instrument and its theory of operation) for clinical measurements of microcirculatory blood flow, number density of flowing red blood cells (RBCs), and mean RBC velocity. Assistance has been given to the commercialization of this methodology and its application to clinical research in many laboratories worldwide. Our clinical studies have been directed toward examining normal and abnormal microvascular dynamics through noninvasive clinical studies of skin and nasal mucosa, and in intra-operative clinical studies of muscle and CNS. Collaboration with USUHS is directed toward developing endoscopic application of this technology. Considerable theoretical work has been directed toward an adequate construct with which to interpret the physical measurements and refining the accuracy of the microcirculatory measurements. We have discovered abnormal microcirculatory patterns and responses in the skin of patients with sickle cell disease, hypertension, certain cardiac circulatory syndromes, diabetes, and skin cancer. The microcirculatory effects of therapy are monitored with this technique, affording a better understanding of the microcirculatory component of these diseases.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10116-06 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Modeling of Arterial Pulse Waves

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.S. Chadwick	Head, Theor. Biomec. Group	BEIB	DRS
D. Goldstein	Senior Investigator	EHL	NHLBI
H. Kaiser	Chief	EHL	NHLBI
M. Safar	Prof., Centre de Diagnostic, Hopital Broussais		

COOPERATING UNITS *(if any)*

NHLBI, Endocrine-Hypertension Laboratory
Centre de Diagnostic, Hopital Broussais, Paris

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.05	.05	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A pulse wave theory and a model of the human brachial arterial system is developed that predicts the changes in the arterial pressure waveform as it traverses the vasculature - increased pulse, sharper main wave, disappearance of the aortic incisura, and appearance of a diastolic dicrotic wave. It also predicts the observed modulation of the waveform during phenylephrine-induced vasoconstriction and nitroglycerin-induced vasodilation. The model considers the brachial arterial system as a tapered distensible tube ending in a loop, with side branch networks represented by distributed Windkessels, an it uses verifiable values for realistic parameters. We found that the vertical modulation of the dicrotic wave in people decreased with advancing age and with high blood pressure; the model explains these finding in terms of increasing vascular rigidity and decreasing small vessel vasodilation responsiveness. We noted a significant negative correlation between the arterial level of plasma norepinephrine and the amount of modulation of the dicrotic wave after nitroglycerin among subjects 40 years old or younger, suggesting a sympathetic neurogenic contribution to the vascular abnormalities observed in relatively young patients with essential hypertension.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10122-06 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Microcomputer Applications for the NIH Bio-Technology Unit (Pilot Plant)

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T.R. Clem, Sr.	Electronics Engineer	EEES BEIB DRS
Other Investigators:		
Y. Shiloach	Chief, Bio-Technology Unit	LCDB NIADDK
A. LeRoy	Chemical Engineer	BEIB DRS

COOPERATING UNITS *(if any)*

LCDB - NIADDK

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.75	0.25

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The NIH Bio-Technology Unit (Pilot Plant) has various instrumentation needs that have not been previously addressed and is using some cumbersome techniques and/or outdated equipment. This project has been concerned with satisfying these instrumentation needs using modern equipment and low-cost desktop size personal computers (PCs). Several PCs have been acquired and are being installed to supply a variety of services, including process control, data acquisition, data analysis, and administrative functions. The instrumentation and process control functions use commercial equipment, as much as possible, and are interfaced using standard I/O connections, such as the IEEE-488 GPIB and the RS-232 Serial I/O ports.

Using these techniques allows changes in the parameters measured or controlled to be accomplished relatively quickly and easily. Utilizing the computational capabilities of the computer/controller allows initial selection of the operating parameters and dynamic alteration of these parameters as the process continues, thus allowing optimization of yields or detailed study of the process parameters.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10146-05 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Prosthetic Urethral Sphincter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S. B. Leighton	Mechanical Engineer	BEIB	DRS
Steven Scoog	M.D.		WRAMC
T. Radebaugh		BRCM	NIA

COOPERATING UNITS *(if any)*

BRCM, NIA
DCT, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.05	.	.05

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A number of techniques are used for treating urinary incontinence, including prosthetic sphincters. The present work concerns an entirely intraurethral artificial sphincter that can be implanted without surgery. Concepts are being explored that would allow the device to be used in situations in which surgery is contraindicated, and would presumably lower the cost. The valve would be appropriately matched to urethral dimensions, pressures, and flow rates. The valve would be potentially useful in cases of non-opening, normal valves as well as in cases of non-closing valves.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10151-05 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Nuclear Magnetic Resonance Imaging

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Dr. David I. Hoult	Physical Scientist	BEIB	DRS
Other personnel:			
Dr. Ching-Nien Chen	Expert		
Dr. L. Kyle Hedges	Staff fellow		

COOPERATING UNITS *(if any)*

Department of Radiology, Clinical Center

LAB/BRANCH

NMR Imaging Laboratory, Biomedical Engineering and Instrumentation

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	3.0	0.0

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

With the completion of the radiofrequency (r.f.) probe design for 3-dimensional rotating frame imaging, attention has focused on the development of slice selection techniques using the gradient r.f. field. A method has been successfully developed for cancellation of artifacts contributed from outside the slice, and progress has been made in extending the distance off-resonance at which the method works. To improve image quality, the homogeneity of the magnet is also being bettered. The control computing facility of the new *in vivo* NMR center has been installed, and good progress made on the production of a software "tool kit" that uses the Lexidata display via the Analogic array processor. A preliminary simulation and display program, using a numerical solution of the Bloch equations, has been completed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: ZO1 RS 10156-05 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Differential Scanning Calorimeter

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd	Biomedical Engineer	ACES	BEIB DRS
T. Talbot	Mechanical Engineer	ACES	BEIB DRS
P.D. Ross	Physical Chemist	LMB	NIADDK

COOPERATING UNITS *(if any)*

A LMB, NIADDK

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda. MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3.	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The application of sensor design and modelling techniques from earlier work in differential heat conduction calorimeters to DSC (Differential Scanning Calorimetry) has produced a prototype DSC with a 10-fold increase in effective sensitivity. The effective increase in sensitivity was due to two factors: 1) new thermopile design with increased thermal sensitivity, and 2) an improved cell mounting design that increased the common-mode rejection of the system. The prototype was placed in service and evaluated in late 1985. After several months, noise problems developed that were traced to the sensors. Since these sensors are designed and manufactured for use as heat pumps (peltier mode of operation) and not sensors (Seebeck mode of operation), the manufacturers could not supply information on noise performance. We then initiated a program to evaluate the noise and failure modes of sensors from several different manufacturers. The noise was traced to mechanical failures in the thermocouple elements caused by large stresses developed across the thermopile when the calorimeter temperature was ramped from 30 deg. C to 80 deg. C. The sensor assembly consisted of four different materials held in place with stainless steel screws. The difference between the coefficients

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10157-04

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Temperature-Controlled Chamber for X-ray Diffraction Specimens

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.P. Mudd	Biomedical Engineer	BEIB	DRS
H.W. Tipton	Mechanical Engineering Tech.	BEIB	DRS
A.V. Parsegian	Researcher	LMB	NIDDKD
D. Rau	Researcher	LMB	NIDDKD

COOPERATING UNITS *(if any)*

DCRT

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Two new temperature-controlled chambers were constructed and evaluated. The new units incorporated a linear feedback sensor and bipolar power supply to allow regulation at any temperature between -3 deg.C and +85 deg.C. The set temperature is entered via a 3-digit thumb wheel switch and the sample temperature is read out on a 3 1/2 digit display. The time required for 95% response to a 10 deg.C change in the set temperature is approximately 70 seconds. The time required for 95% response to a change from 0 deg.C to 70 deg.C is approximately 300 seconds. At equilibrium, the baseline stability is +/- 15 milli-deg.C. Two types of cells were developed to contain the sample under investigation. The first is a simple closed cell in which the sample solution is sealed between two mylar wafers in an aluminum cell. The second type of cell is open and can be flushed during runs without removal from the chamber.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10162-05 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Wound Healing: Biology and Rheology

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot, MS	ACES, BEIB	DRS
Walter T. Lawrence M.D.	Surgery	NCI
Lawrence E. Thibault, Sc.D.	Bioengineering Dept,	Univ.of Pa

COOPERATING UNITS *(if any)*

NCI, University of PA, Philadelphia, PA

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.2	1	0.2

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Preliminary studies have been completed with swine models. These studies involved stamping an indelible grid (10 cm x 10 cm) on the skin of an anesthetized swine, excision of a 1 cm x 10 cm strip of the skin out of the grid area, and approximating the incision edges with silk sutures. Photographs of the grid were taken before excision, after excision, and after suturing. These photographs are being analyzed to determine the impressed strain on the wound closure and eventually relate this information to wound breaking strength (WBS).

Studies based on a rat model that relate biologic and pharmacologic interventions to WBS have been completed. Certain groups were treated pharmacologically during the wound healing process. Significant decrease in WBS was observed in these groups, compared to control groups. Further studies will include the comparison of a tumor-bearing group to control groups.

Rats treated with 8 mg/kg Adriamycin prior to or on the day of wounding demonstrated decreased wound breaking strength in incisional wounds at all intervals after wounding.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10163-05 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(50 characters or less. Title must fit on one line between the borders.)*

Magnetoencephalographic Localization of Foci of Neurologic Activity

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.D. Smith	Physicist	BEIB	DRS
Others:			
J.L. White	Electronic Eng.	BEIB	DRS
W.S. Friauf	Chief	BEIB	DRS
S. Sato	Neurologist	OCD	NINCDS
D. Rose	Clinical Assoc.	MNB	NINCDS
R. Porter	Chief	MNB	NINCDS

COOPERATING UNITS *(if any)*

Medical Neurology Branch, NINCDS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5		1.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

SQUID (superconducting quantum interference device) magnetometers have been used to study the magnetic activity associated with spike discharges occurring in interictal periods in patients with temporal lobe epilepsy. Magnetic field maps associated with specific spike discharges were obtained from measurements made with the SQUID at various locations on the skull. Mathematical models, which accounted for the head shape of the patient and the orientation of the SQUID, were developed to calculate the predicted magnetic field maps. These comparisons of the experimental and theoretical data indicate close agreement in some areas, but significant deviations in others, that are not explained by skull topography alone. A seven-channel SQUID has been obtained and is being evaluated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10170-05 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Biological Applications of a Computer-Controlled Analytical Electron Microscope

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB	DRS
Others:			
C.E. Fiori	Physical Scientist	BEIB	DRS
C.R. Swyt	Physical Scientist	BEIB	DRS
J.A. Hunt	Electronics Engineer	Lehigh University	

COOPERATING UNITS *(if any)*

CSLT, DCRT

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Electron energy loss spectra have been obtained by means of a Gatan parallel detector system consisting of Post-spectrometer Quadrupole lenses, a YAG scintillator, fiber-optic coupling, a photodiode array and associated electronics. The detector quantum efficiency was measured and found to be close to unity, giving approximately a 1000-fold improvement over the conventional serial recording of spectra. An energy resolution of about 1.5 eV was achieved at 100 keV beam energy. Spectra with good counting statistics could be recorded in 100 milliseconds, thus allowing real-time EELS to be performed. Preliminary data have been obtained from some fluorine analogs of neurotransmitters, indicating that such compounds might be detectable at biologically meaningful concentrations with an integration time of 1 second. It has also been possible to monitor radiation damage and mass loss in real-time by observing the decay of nitrogen, oxygen and fluorine core edges in organic molecules.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10184-04 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Physical Chemistry of Biological Macromolecules

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Marc S. Lewis Research Chemist BEIB DRS

COOPERATING UNITS *(if any)*

LB/NIDR; LBDA/NIDR; SNB/NINCDS

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Microanalysis

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.9	0.9	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of this project is to study the physical properties of a wide variety of biological macromolecules with the goal of correlating these properties to the structure and function of the macromolecules. The emphasis is on the thermodynamics of the interactions of these macromolecules and on their molecular size and shape. Analytical ultracentrifugation and mathematical modeling are the principal research techniques used.

Studies on the association of fibrinogen with other proteins involved in blood clotting and fibrinolysis have been continued. Studies in progress in this area deal with the association of fibrinogen with plasma and platelet Factor XIII and with the association of plasminogen with the D and E fragments of fibrinogen.

Research on ricin has involved studies on a monoclonal antibody to the ricin B chain, the interaction of this antibody with ricin, and its effect on ricin toxicity both in vitro and in vivo.

Studies on synapsin have been directed toward determining the nature of the reactions involved in the self-association of this protein.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10185-04 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Interventional Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

John W. Boretos Physical Scientist BEIB, DRS

Others:

John Doppman, M.D.	Radiologist	DR, CC
Edward Oldfield, M.D.	Neurosurgeon	NINCDS
Robert L. Dedrick, Ph.D.	Chem. Eng.	BEIB, DRS

COOPERATING UNITS *(if any)*

DR, CC, NIH; NS, NINCDS, NIH;
BEIB, DRS, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.4	0.7	0.7

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The purpose of the project is to develop a catheter system for interventional radiology capable of traversing small and branching blood vessels (i.e., 1.5 to 4.0 mm) to reach the proximity of tumors and to administer chemotherapeutic drugs to these tumors in a controlled manner. A major obstacle to effective treatment is thought to be maldistribution of the drug at the site due to inadequate mixing of the drug with the blood. A revised version of the multilumen catheter previously reported has been developed that has greatly simplified the use of the jet principle for mixing. Fluid turbulence generated by drug emanating at retrograde angles from the tip of the catheter adds significantly to the mixing of the drug within the blood stream.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10193-04 BEI

PERIOD COVERED

October 1, 1985 to September 30, 1986

TITLE OF PROJECT *(80 chereters or less Title must fit on one line between the borders.)*

Development of Everting Toposcopic Catheter for Clinical Gastroenterological Use

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, leboratory, and institute affiliation)*

D.R. Shook Biomedical Engineer BEIB DRS

COOPERATING UNITS *(if any)*

Georgetown University Medical Center (E.L. Cattau); Esophageal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.J. Vener)

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.2	PROFESSIONAL: 0.2.	OTHER:

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The everting catheter promises to facilitate the catheterization of the pancreatobiliary ducts through the papilla of Vater. An initial series of patients has undergone routine endoscopic retrograde cholangiopancreatography (ERCP), using the catheter for infusion of contrast agents. An extensively modified catheter is passed through an appropriately positioned endoscope. The catheter tip is placed within the ampulla, and the element is everted. In basic ERCP, contrast medium is then injected for diagnostic procedures. Catheter modifications include an overall lengthening to approximately 200 cm, while eliminating any added length to the everting element beyond that required by the clinical procedure. This keeps frictional drag of the element to a minimum. Where kinking of the tip of the primary catheter in the endoscope presents a problem, reinforcement of the tip or a change to polytetrafluoroethylene (PTFE, Teflon) materials has been made. In addition, the catheter's ability to atraumatically negotiate small, tortuous ducts is being investigated for catheterization of pancreatic and cystic ducts for sampling of secretions, placement of biliary stents, and conveyance of CCD video cameras.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10194-04 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Optimized Polymer Processing for Advanced Catheter Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook, Biomedical Engineer, BEIB, DRS

COOPERATING UNITS *(if any)*

Diagnostic Radiology, CC (J.L. Doppman); Esophogeal, Gastric and Colonic Diseases, Digestive Diseases and Nutrition Division, NIADDKD (K.S. Vener)

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Advanced techniques of plasticating extrusion can produce materials of optimized anisotropic properties and very fine dimensional characteristics. Availability of such materials then supports development of unique polymeric medical devices, such as the everting catheter. Current efforts are to optimize the toposcopic catheter material for maximally safe operation in arterial dilatation.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10201-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Automated Cell-Colony Scanner System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Seth Goldstein	Chief, MES	BEIB	DRS
Michael Brownstein	Chief	LCB	NIMH

COOPERATING UNITS *(if any)*

Laboratory of Cell Biology, NIMH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.2	.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A system has been developed to identify, for subsequent cloning, a minute fraction of cells in tissue culture possessing specific antibody, or other, fluorescent tags. Major emphasis was on making the system simple, inexpensive and readily available to investigators. A variety of concepts and techniques were identified and evaluated, and the most promising has been developed into a computer-controlled instrument. Final evaluation is being performed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10204-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 chererters or less Title must fit on one line between the borders.)*

Cell Handling Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S.B. Leighton	Mechanical Engineer	BEIB	DRS
J.A. Berzofsky	M.D.	DCBD	NCI

COOPERATING UNITS *(if any)*

DCBD, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.5	.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

In work on monoclonal antibodies, as well as in other endeavors, it is desirable to be able to manipulate and process individual cells. We are investigating a number of modalities that may make this possible, including flow cytometry, micromanipulation, dielectrophoresis, micropipetting, use of microtitre trays, and tissue culture techniques. We are considering sorting, storing, transporting and selectively inactivating cells. In addition, we are considering magnetic, gradient density, antigen-antibody, and solubility difference methods as possible candidates for separation techniques.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10207-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Clinical Engineering Program, Clinical Center Patient Areas

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey,	Electronic Engineer, ACES, BEIB	DRS
L. Eldridge,	Assoc. Hospital Administrator,	CC
C. Strong,	Environmental Safety Officer,	CC
J. Harrison,	Building Services Manager,	CC
R. Bruun,	Assoc. Hospital Administrator,	CC
J. Decker,	Director,	CC
S. Galen,	Associate Hospital Administrator,	CC

COOPERATING UNITS *(if any)*

Clinical Care Instrumentation Section, DRS, NIH
Nursing Department, CC, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
4.0	1.8	2.2

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A clinical engineering program is provided for the Clinical Center that is devoted to protecting patients from hazards. This consists of establishing electrical safety standards, safety procedures and safe-practice recommendations through active participation on Clinical Center standing committees. In addition the program consists of active participation in standards-making activities, such as those of the American Hospital Association, the Joint Commission on Accreditation of Hospitals, the Association for the Advancement of Medical Instrumentation, and the National Fire Protection Association. A focus of the program is to investigate electrical incidents, such as electric shock to patients or personnel, and to plan corrective action. The program also acts as a resource center for advice on the general application of engineering to medicine. This is mostly accomplished through lectures and seminars.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10210-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Electronic Patient Monitoring System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

H.E. Cascio, Electronic Engineer, BEIB, DRS

Others:

G. Hemphill, Engineering Technician, BEIB, DRS
K. Musallam, Head Nurse, NURS, CC
D. Cirelli, Administrator Officer, OD, CC

COOPERATING UNITS *(if any)*

CCOD

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS: 0.8	PROFESSIONAL: 0.3	OTHER: 0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An electronic patient monitoring system that alerts the nursing staff when a patient (or patients) is leaving the nursing unit is a welcome aid in the care of Alzheimer's disease patients and other patients with dementia. The system design is based on a wrist watch size radio transmitter, worn by the patient. A detector unit, placed at the two doors, senses the presence of any patient wearing a transmitter watch. With the detection of a patient's transmitter, a microprocessor based controller locks the exiting door, activates an alarm, and displays the patient's name and location on a computer monitor screen. The personal computer records the time and date for each patient's attempt to leave the unit. This data may then be used for statistical analysis. The number of patient monitoring channels has been increased from four to eight. The system has been in continuous operation and has become a dependable aid to the nursing staff.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10211-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

IEEE-488 GPIB Personal Computer Instrumentation Use Program Development

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T.R. Clem, Sr., Electronic Engineer, EEES, BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.25	0.2	0.05

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The increased availability and reduced cost of the small Personal Computer has created increased interest in automating data acquisition and process or experiment control in areas where such things were not feasible before because of too high a cost or great complexity. With these changes also came a significant increase in the use of the IEEE-488 GPIB by instrument makers. By combining the two, sophisticated instrumentation and data acquisition systems can be assembled quickly and inexpensively. The BEIB is continuing to develop the expertise to provide guidance and assistance where this approach provides the optimal solution. This capability is further assisted by the BEIB Scientific Equipment Rental Program (SERP) specifying the IEEE-488 interface on new equipment acquisitions whenever possible. The increase at the NIH in the numbers and use of the IBM PC has made this capability of great value to the NIH Intramural Research program.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10212-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Fluoroimmunoassay Apparatus

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W.S. Friauf Ch., EEES — BEIB, DRS
R.L. Berger Physicist, LTD — NHLBI
G. Hemphill Electronic Tech. — BEIB, DRS

COOPERATING UNITS *(if any)*

CDC, Atlanta

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.1	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

New rare earth chelate fluorescent probes with decay time constants much longer than the background decay time-constant of typical organic materials offer the potential of a great improvement in sensitivity of time resolved fluorimetry. However, if they are to rival radioimmunoassay methods the sensitivity requirement becomes so great that overload recovery of the fluorescence detector is a major problem. Extensive past work on this problem is largely inapplicable to the very low speed and level requirements of this situation. Consequently initial effort is being applied to determining the optimum fluorescence detection device and ancillary signal overload limiting circuitry. Problems related to the fluorescent probe at extremely low sample concentrations will be studied in collaboration with CDC, which is interested in this approach as another tool for AIDS research. Finally an evaluation of the details of excitation, optical filtering, and digital signal processing will be worked out and optimized.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10213-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Vitreous Fluorophotometry Analysis

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.M. Bungay Chemical Engineer	BEIB, DRS
R.F. Bonner Biophysicist	BEIB, DRS
M.S. Roy Ophthalmologist	CB, NEI
M.J. Podgor Statistician	BE, NEI

COOPERATING UNITS *(if any)*

Clinical Branch, NEI; Off. of Biometry & Epidemiology, NEI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.5	1.0	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Vitreous fluorophotometry (VFP) is a clinical procedure for measuring the spatial distribution of fluorescence along the optical axis in a human subject's vitreous following administration of a fluorescent dye. In this project the clinical instrument is a Fluorotron Master manufactured by Coherent, Palo Alto, CA, and the dye is sodium fluorescein given by intravenous injection. The purpose of the project is to improve the protocols for conducting the measurements, processing the output from the instrument, and analyzing the results from the population of normal volunteers and patients.

One disease for which VFP may be useful is diabetes and the associated pathology, diabetic retinopathy. The goals are to evaluate the procedure for use in 1) screening for early detection, and 2) monitoring for treatment efficiency. A pharmacokinetic mathematical model has been developed that describes the rate of appearance of fluorescein in the vitreous in terms of the blood-retinal permeability (characterized by a permeability coefficient of the retina-vitreous interface) and transport of fluorescein within the vitreous by diffusion (characterized by a diffusion coefficient). Plasma protein binding of fluorescein is also incorporated in the model.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10214-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Photoradiation Therapy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI:	P.D. Smith	Physicist	BEIB	DRS
Others:	R.F. Bonner	Biophysicist	BEIB	DRS
	A. Russo	Section Chief	ROB	NCI
	M. Manyak	Staff Fellow	ROB	NCI
	T. Delaney	Clin. Assoc.	ROB	NCI
	H. Pass	Surgeon	SURG	NCI
	D. Matthews	Veterinarian	VRB	DRS

COOPERATING UNITS *(if any)*

ROB, NCI; VRB, DRS; SURG, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.5	2.5	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Photodynamic therapy (PDT), which is the interaction of light with hematoporphyrin derivative (HDP, Photofrin II), is in clinical use in several areas of application. Currently, PDT is being used clinically for a variety of skin lesions and for bronchial obstructions and is being investigated in the following: cancer of the prostate (beagles); carcinoma in situ of the bladder and urinary tract (foxhounds); and pulmonary metastatic disease (nude mice). Specially designed fiber optic probes and and introducers were manufactured for all cases, and calibrated in terms of irradiance delivered to the tissue. Photosensitized skin is a side effect of PDT, and the possibility of using agents to protect against this photosensitivity was addressed. In particular, hydrochlorothorazide appears to have a pronounced effect on reducing skin photosensitivity in nude mice models. Dosimetry for PDT is complex due to the variable irradiation levels within the tissue, sequestering of HDP, and tissue oxygenation. To address the first of these points and to

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10215-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Measurement of Trace-Level Metals and Complexes in Biological Milieux

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A.F. LeRoy, Ph.D.	BEIB, DRS
M. Linnoila, M.D., Ph.D.	CPB, NIMH
K. Flora, Ph.D.	PRB, NCI
M.K. Wolpert, Ph.D.	Drug Eval. Br., DCT, NCI
P. Galle,	Medical Faculty, Creteil, France
B. Hecquet, Ph.D.	Centre Oscar Lambret, Lille France
P. Parsons, Ph.D.	BEIB, DRS
W. Thompson	BEIB, DRS

COOPERATING UNITS *(if any)*

CPB-NIMH,DCT-NCI, PRB-NCI, Biophysics Dept., Med. Faculty, Creteil, France: Centre Anti-cancereux "Oscar Lambret", Lille, France

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Analytical Methods

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.20	0.70	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Analytical methods have been developed for separation, quantitation and characterization of elements (principally metals) and their complex species (coordination compounds) present in biological samples at trace levels. *In vivo* and *in vitro* studies designed to produce biologically relevant results require the ability to separate and quantitate the metals in the low concentrations obtaining as well as the ability to relate their concentrations to the biological milieux and their components quantitatively.

To understand the mechanisms of action of the drugs under study it is important to understand the interactions of the metal complexes with proteins and other constituents. Unfortunately many studies reported in the literature have been conducted at much higher concentrations for want of analytical methods with the requisite sensitivity. In the case of the platinum drugs there is a further complicating factor in the relatively slow kinetics of some of the reactions; many published studies assume that the metal complex species and their interconversions are

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10216-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Enzyme Purification - Calmodulin

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A.F. LeRoy, Ph.D.	BEIB	DRS
R. Berger, Ph.D.	LTD	NHLBI
W. Thompson	BEIB	DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Analytical Methods

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The validity of studies of calmodulin's properties depends on quantifiable measures of purity of the enzyme preparation and the proportion of calcium it contains, and requires the availability of extremely pure reagents, buffer, and solvents. Analytical methods have been developed for quantitaiton of picogram quantities of calcium in highly purified preparations of calmodulin and in the reagents and solvents needed to make the preparations. Preliminary analyses show that the reagents and solvents needed for making ultra-pure enzyme preparations can be freed to satisfactory levels from such ubiquitous contaminants as calcium using techniques developed in our laboratory.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10218-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 charecters or less. Title must fit on one line between the borders.)*

Analytical Electron Microscopy of Adrenal Chromaffin Cells

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R.D. Leapman	Visiting Scientist	BEIB, DRS
Others:		
R.L. Ornberg	Biophysicist	LCBG, NIDDK
H. Pollard	Chief	LCBG, NIDDK

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.8	0.8	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Elemental and water content of cultured bovine adrenal chromaffin cells and their secretory granules have been measured and compared with isolated chromaffin granules using rapid freezing, ultracryomicrotomy, x-ray microanalysis and electron energy loss spectroscopy. Changes in monovalent ion concentrations on isolation were found to be large whereas calcium and phosphorus concentrations remained approximately constant. Using measured water contents of different compartments it was possible to estimate a positive granule membrane potential (inside to outside) of approximately 10 to 16 mV. Additional experiments were performed to measure changes in granule composition by adding ammonia to the culture medium to induce changes in internal pH.

Cellular water content was determined using inelastic electron scattering as measured by EELS. The method was first tested on hydrated cryosections of standards and was then applied to different compartments of the chromaffin cell.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10219-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Quantitative Elemental Analysis of Rapidly-frozen Neural Tissue

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. D. Leapman Visiting Scientist BEIB
Others:
S.B. Andrews Special Expert LN, NINCDS
T.S. Reese Chief LN, NINCDS
D.M.D. Landis Neurobiologist Dept.Developmental Genetics and Anatomy, Case Western Reserve University School of Medicine, Cleveland, Ohio

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Elemental analysis of incubated and freshly cut mouse cerebellar slices was performed by means of energy-dispersive x-ray spectroscopy in a Hitachi H700H analytical electron microscope. Freeze-dried cryosections were probed in order to measure potassium and calcium concentrations in Purkinje cell dendritic spine organelles. The calcium content of spine cisterns from "resting" synapses was found to be 2.5 ± 0.5 mmol/kg dry weight, compared with a concentration of 6.7 ± .06 mmol/kg dry weight in fresh (i.e., stimulated) synapses. The potassium concentration in both the resting and stimulated synapses remained high and approximately constant, indicating physiological integrity of the tissue.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10225-03 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Processing of High Resolution Electron Micrographs

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Michael Unser	Visiting Fellow	BEIB, DRS
Benes Trus	Research Chemist	CSL, DCRT
Alasdair C. Steven	Visiting Scientist	LPB, NIADDK

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

High resolution micrographs are often of poor quality, due to a variety of distortions and especially due to a very low signal-to-noise ratio. For micrographs of quasi-periodic arrays or sets of images of ostensibly identical free-standing particles, visual quality can be improved significantly by using correlation-averaging techniques.

We have improved algorithms that we had previously developed for the translational and rotational alignment of different views of ostensibly identical specimens and for the compensation of spatial deformations in quasi-periodic crystalline structures.

We have developed a technique for the quantitative assessment of spatial resolution that is equally applicable to periodic and non-periodic structures. This approach is based on the estimation of a spectral signal-to-noise ratio.

These methods have been applied successfully to structure determination and quantitative assessment of T7 Virus. They are currently being used for the analysis of micrographs of skeletal muscle filaments in both relaxed and rigor state.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10227-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

In Vivo Evaluation of Pulsed Intra-Arterial Infusions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

D.R. Shook	Biomedical Engineer	BEIB	DRS
S. Saris	Staff Neurosurgeon	SNB	NINCDS

COOPERATING UNITS *(if any)*

Diagnostic Radiology, CC; Surgical Neurology, NINCDS;
Veterinary Resources Branch, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Mechanical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.02	0.02	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Diastolically-phased, pulsed intra-arterial infusions have been shown to be an effective means to produce uniform mixing of blood and drug, when measured in downstream branches of a model of the cerebral circulation. The technique has also been evaluated in the cerebral circulation of fully anesthetized Rhesus monkeys by infusion of radio-isotope-labelled iodoantipyrine into the internal carotid artery. The resulting tissue concentration, determined by quantification of autoradiographs, showed high uniformity, indicating that the deleterious effects of infusate streaming can be alleviated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10230-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Television Tracking of Beating Heart Cells in-vitro

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. Schuette	Chief, ACES	BEIB	DRS
J. Parrillo	Chief, CCMD		CC
C. Burch	CCMD		CC

COOPERATING UNITS *(if any)*

DRS, BEIB
CCMD, CC

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD, 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	0.6	0.4

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A television tracking system has been developed to measure the motion of beating heart cells *in vitro*. The performance of these cells is used to monitor the presence of a circulating myocardial depressant substance in humans with septic shock. Beating myocardial cells are placed in a petri dish on the stage of an inverted microscope and imaged by a television camera. When serum from patients is added to the medium surrounding the beating cells, the performance of the cells is affected, if the circulating myocadial depressant substance is present. Motion voltages developed by the closed-loop television tracking system are processed on-line by a PC computer with A/D and D/A capability. Baseline data, without patient serum, is obtained by a computer-controlled flushing system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10232-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Hardware Expansion for Flow Cytometer

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer	EEES, BEIB, DRS
J.A. Dvorak	Researcher	LPD, NIAID

COOPERATING UNITS *(if any)*

LPD, NIAID
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronics Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Due to maintenance cost a complete redesign of the electronics is underway. The interface circuitry is being reduced and a much simpler method of interfacing is being used. The PDP-11/34 is replaced by an Intel 386 computer running at 20 MHz. The software is rewritten to implement all previous functionality plus new features.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10233-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Computer System for Analysis of Monkey Vocalizations

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer,	EEES, BEIB, DRS
Dr. D. Symmes,		LCE, NICHD

COOPERATING UNITS *(if any)*

LCE, NICHHD
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.3	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A computer system has been assembled to analyze monkey vocalizations and display the results in the traditional waterfall display format. The computer is a DEC PDP-11/23 with a Sky array processor and a fast A/D front end. The complete system is almost an order of magnitude faster than any other commercial or non-commercial unit in use at this time. A direct memory interface is being built to capture data from a Kay Elemetrics model 7800.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10234-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Computer-Aided Tracking of Myosin Coated Beads on Actin Filaments

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson,	Electronics Engineer	EEES, BEIB, DRS
D.Sellers,		LMC, IR, NHLBI

COOPERATING UNITS *(if any)*

LMC, IR, NHLBI
EUII, BEIB, DRS

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronics Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A manual system using a TV camera, VCR, and an IBM PC/XT clone has been put together to track particles moving in a microscope field. All programming is done in the computer language "C".

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10236-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 charecters or less. Title must fit on one line between the borders.)*

Instrumentation for Various Electron Microscopes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C.C. Gibson	Electronics Engineer	EEES, BEIB,	DRS
C.E. Fiori	Physicist	OC, BEIB,	DRS

COOPERATING UNITS *(if any)*

EU II, BEIB, DRS
CSL, DCRT

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

An IBM PC/AT Clone with a 10 MH_z clock and 70 Mbyte hard disk unit has been purchased along with a number of add-in cards and an expansion unit. Work is almost completed on connecting the computer to the parallel detection unit on the Hitachi 700 scanning transmission electron microscope (STEM). This will permit data acquisition for electron energy loss spectroscopy (EELS) to occur an order of magnitude faster. The next phase is to connect the computer to BEIB's Cameca microprobe to automate data collection.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10238-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Automation of BEIB Information Processing Functions

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

J.R. Ellis	Expert	OC	BEIB	DRS
C.Martin	Management Analyst	MAO		DRS
C.C. Gibson	Electronics Engineer	EEE		
R.L. Levin	Biomedical Engineer	MES	BEIB	DRS
M.E. Gavin	Management Assistant	OACSES	BEIB	DRS

COOPERATING UNITS *(if any)*

DRS, MAO
DCRT, CSL

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.0	1.5	0.5

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The computational and accounting resources of the branch are often inadequate to the demands placed on them. The objective of this project are: to determine the needs of the branch; to identify appropriate resources; and to match resources to changing user demands.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10240-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Clinical Measurement of Microvascular Blood in Sickle Cell Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E.C. Walker	Mechanical Engineer	BEIB	DRS
G.P. Rodgers	Robert Wood Johnson Fellow	LCB	NIDDK
A.N. Schechter	Chief	LCB	NIDDK

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.6	1.5	0.1

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☒ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

It is commonly known that sickle cell patients possess red blood cells that have abnormal rheological properties. The cell properties affect bulk vascular flow in general and microvascular flow in particular. Severe manifestations of this disease can be observed acutely, during intensely painful crises, and chronically, as demonstrated by damage to the cardiovascular system and various organs. It is our intention to develop and explore the use of non-invasive instrumentation to study the character and degree of peripheral blood flow in stable sickle cell patients. We are currently using a commercial laser Doppler velocimeter to monitor microvascular flow, venous occlusion plethysmography to monitor total flow and pulse oximetry to monitor systemic oxygen saturation. Because the devices we employ are relatively new, we will also develop a reliable means for evaluating them for potential use with our patient population.

Flow studies of this nature can lead to improved understanding of the micro obstructive component of sickle cell disease as well as serve to evaluate potential therapies such as hydroxyurea.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10241-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 charecters or less. Title must fit on one line between the borders.)*

Cisplatin Kinetics

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.F. Morrison Physical Scientist BEIB, DRS
P.J. Parsons Research Scientist N.Y. State Dept. Health

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Chemical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.2	0.2	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Experimental and theoretical studies on the chemistry of cisplatin (DDP) have been continued with the goal of characterizing the reaction kinetics of the drug *in vitro*. Principal reactive species and pathways have been identified over the first 24 hours of drug reaction in various buffered inorganic solutions and plasma ultrafiltrates.

Separation of drug aquation/hydrolysis products has been accomplished by reverse phase high-performance liquid chromatography with electrochemical detection. Parent, monoaquo and diaquo drug forms are detectable by this technique. Quantitative assessment has been enhanced by computing areas under chromatographic peaks rather than depending on peak heights, a significant improvement for monoaquo measurement since the peak of this compound appears on the shoulder of an oxygen peak.

Experimental results have shown that DDP reacts with pure water at a rate close to that of its degradation in plasma ultrafiltrate, despite the high chloride content of the latter solution. While some of the plasma reactivity is attributable to small molecular weight nucleophiles such as methionine and perhaps bicarbonate, the

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10247-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(80 charecters or less. Title must fit on one line between the borders.)*

The Effect of Mitral Valve Replacement On Left Ventricular Geometry

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

Thomas L. Talbot, M.S.	ACES	BEIB	DRS
Robert J. March ,M.D.		SB	NHLBI
Richard E. Clark, M.D.		SB	NHLBI

COOPERATING UNITS *(if any)*

Surgery Branch, NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation Branch

SECTION

Applied Clinical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The correction of chronic mitral insufficiency by conventional mitral valve replacement carries a higher postoperative morbidity and mortality than operations for most other valvular lesions. Clinical studies have shown that valvuloplasty performed to correct mitral insufficiency is associated with a lower morbidity and mortality than with valve replacement. It is suggested that the maintenance of the mitral apparatus (chordae tendinae) prevents enlargement of end-diastolic and end-systolic dimensions. By utilizing each ventricle as its own control, the effect of chordal severance after valve replacement on regional and global geometry was examined. Two groups of animals (chronic and acute) were compared.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10248-02 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Intra-arterial Optical Evaluation

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

PI: P.D. Smith	Physicist	BEIB	DRS
Others			
R.F. Bonner	Biophysicist	BEIB	DRS
R. Balaban	Physical Scientist	LKE	NHLBI
M.B. Leon	Cardiologist	CB	NHLBI
D. Lu	Clinical Assoc.	CB	NHLBI
R.L. Bowman	Chief	LTD	NHLBI

COOPERATING UNITS *(if any)*

NHLBI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Evaluation of the intra-arterial wall surface is necessary for control of laser ablation of tissue. Angioscopy produces clear observation of the target sites, provided adequate irrigation of the vessel with saline solution is maintained. Precise quantitative location of the target is difficult. In addition, size constraints may limit angioscopy's usefulness in the coronary vessels.

Preliminary fluorescent observation of atheromas and normal aorta specimens from humans was performed using a fluorescence microscope with 450-490 nm excitation. Fluorescence spectra collected using a multi-channel analyzer indicated clear intensity differences between the normal and atheromatous tissue. These differences were eliminated by ablation of the atheroma by either an argon laser (514nm) or a xenon chloride (308) excimer laser.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

ZO1 RS 10249-02 BEI

PERIOD COVERED

October 1, 1986 to September 30, 1987

TITLE OF PROJECT *(60 characters or less. Title must fit on one line between the borders.)*

Kinetics of Folate Metabolism

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

P.F. Morrison	Physical Scientist	BEIB	DRS
C.J. Allegra	Physician	CP	NCI

COOPERATING UNITS *(if any)*

Clinical Pharmacology Branch, NCI

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, MD 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.8	0.8	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A biochemical kinetic model of folate metabolism in breast cancer cells has been formulated and used to investigate the mechanisms of inhibition of purine and pyrimidine synthesis by the drug methotrexate (MTX). The model consists of two nearly independent components, one accounting for the polyglutamation of MTX and the other accounting for various folate interconversions. Normal folates are all assummed to be highly glutamated at about the pentaglutamate level. The MTX polyglutamation component was successfully modelled by a scheme allowing for glutamation, hydrolysis, and efflux of drug polyglutamates. Model parameters for the second component were derived from a large body of MCF-7 cell line folate data, consisting principally of folate pool concentrations measured by HPLC in both drug-treated and drug free cells, and rate constants determined in kinetic studies of isolated enzyme preparations.

When applied to drug-free MCF-7 cells, the model was capable of reproducing experimental folate concentrations (dihydrofolate (FH_2), 5-methyl-, 10-formyl-, 5,10-methylene-, and unsubstituted

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10250-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Insulin Substrate and Energy Metabolism of Lung Cancer Patients

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. Corsey	Electronic Engineer	BEIB, DRS
J. A. Norton	Section Chief	SURG, NCI

COOPERATING UNITS *(if any)*

Radiology Department, CC, NIH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2	1.5	0.5

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Sarcoma patients exhibit metabolic abnormalities before clinical evidence of cachexia, a complex syndrome that includes tissue wasting, anorexia and asthenia. Laboratory studies of rodents indicate exogenous insulin therapy can reverse cachexia by improving response to chemotherapy, increasing lean mass and increasing surgical survival. This study will investigate whether insulin therapy will benefit cachectic humans. Previous work has not included lung cancer patients; rather, it concentrated on sarcoma patients. Insulin requirements before and after anti-cancer treatment will be determined and compared to age, sex and weight matched volunteers. Resting energy expenditure and forearm flux of substrates will also be measured for patients and matched volunteers.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10251-01 BEI

PERIOD COVERED

June 1987 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

In Vivo System for Studying Tooth Pulp Vitality

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E. C. Walker Mechanical Engineer BEIB, DRS

R. L. Webber Chief, Diagnostic System Branch CIB, NIDR

F. Plowman Technician

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.1	.05	.05

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

We are currently developing an optically based system to determine the vitality of tooth pulp in intact teeth. The technology is based upon the detection of hemoglobin in tooth pulp. We have developed several *in vivo* fiber optic appliances to monitor intact teeth using a previously developed detector/amplifier system. The current system illuminates each tooth with white light and analyzes the transmitted light at several different wavelengths. We have also demonstrated the use of a pulsed LED system for direct illumination with the desired wavelengths.

Future plans call for optimizing the instrumentation so that more in depth studies can be accomplished.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10252-01 BEI

PERIOD COVERED

July 1987 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Physiological Monitoring System for Sepsis Models

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

E. C. Walker	Mechanical Engineer	BEIB, DRS
B. Shepard	Clinical Associate	SURG, NCI
J. A. Norton	Section Chief	SURG, NCI
R. Corsey	Electronic Engineer	BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.1	.1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

For studying the role of cachectin (tumor necrosis factor) in septic shock we are developing a physiological monitoring system for laboratory rats. Direct arterial pressures, temperature, respiration and cardiac output will be monitored.

Special carotid/aortic catheters have been designed and tested for viability and frequency response. A novel body temperature/ respiration probe is being developed for this mode. Future plans are to design and implement a four-channel computer-based monitoring system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10253-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Software Development for Removal of Plural Inelastic Scattering from Electron Energy Spectra

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C. R. Swyt	Physical Scientist	BEIB, DRS
R. D. Leapman	Visiting Scientist	BEIB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A method to determine the plural inelastic scattering contributions to an electron energy loss spectrum from a biological or organic specimen has been developed. A Fortran program based on a multiple linear least squares regression algorithm was written to fit to a collected data spectrum computer-generated reference spectra consisting of the first through nth plural scattering contributions. Fitted distributions are subtracted from the data to reveal contributions from elements in very low concentrations; and quantification of elemental concentrations is obtained from the fitted single inelastic scattering distributions.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10254-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Electron Microprobe Elemental Imaging and Quantitation of Alzheimer's Associated Plaques

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C. R. Swyt	Physical Scientist	BEIB, DRS
Others:		
H. Mori	Visiting Fellow	LNS, NIA
Q. R. Smith	Research Physiologist	LNS, NIA
S. I. Rapoport	Chief	LNS, NIA

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.8	1.8	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The post-mortem distributions and concentrations of calcium, silicon, and aluminum in plaque cores from brains of patients with Alzheimer's disease are being determined from elemental images and spectra acquired by wavelength-dispersive x-ray spectroscopy on a computer-controlled Cameca MBX electron beam x-ray microanalyzer. Both air-dried and freeze-dried cryo-sections 8-10 micrometers thick from fresh frozen specimens with no chemical preparation are being analyzed. The drying methods will be compared for effect on elemental preservation and morphology, and quantitative results compared to those obtained by other workers using fixed material or purified cores.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10255-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

A Temperature-Controlled Microscope Chamber for Intracellular Electrical Activity Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C. P. Mudd	Biomedical Engineer	BEIB, DRS
H. W. Tipton	Mechanical Engineering Tech.	BEIB, DRS
J. Zimmerberg	Researcher	K LBM
A. V. Parsegian	Researcher	K LBM

COOPERATING UNITS *(if any)*

K LBM

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.1	0.1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A temperature-controlled chamber has been constructed which can be placed in the viewing field of a light microscope. The microscope is used to visualize an individual cell within the chamber. An electrode is then inserted into the cell to measure its electrical activity. The feedback thermocouple for the temperature-control system is located near the cell under study. The temperature is then cycled between 37°C and approximately 20°C over the course of 1 minute. The lower temperature inhibits or turns off certain enzymes which affect the electrical activity of the cell. These changes are then observed.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10256-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Mechanical Prosthetic Heart Valve Tester

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T. L. Talbot	Mechanical Engineer	DRS, BEIB
F. A. Arabia	Senior Investigator	SB, NHLBI
R. E. Clark	Chief	SB, NHLBI
S. Hilbert	Engineer	DMMS, FDA

COOPERATING UNITS *(if any)*

Cardiac Surgery Branch, NHLBI
Medical Device Group, FDA

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
2.6	2.0	0.6

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Six different manufactures' prosthetic heart valves were tested and ranked according to performance indices described by W. Swanson and S. Gabby. Additionally, a technique was devised whereby the pressure drop across the aortic valve could be predicted by velocity measurements made with continuous wave Doppler (CWD) imaging. The results of preliminary *in vitro* studies demonstrate a high correlation ($r>0.9$) between the peak velocity as measured with CWD and the predicted velocity obtained by the application of a simplified Bernoulli equation, which uses a measured maximum pressure drop across the aortic valve. Also, an acoustical signature analysis technique is under investigation for possible non-invasive detection of partially-failed single leaflet type mechanical valves.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10257-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Analysis of Propagation of Light in Turbid Biological Tissues

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. F. Bonner	Physicist	BEIB, DRS
R. Nossal	Senior Research	LPS, DCRT
G. Weiss	Chief	LPS, DCRT
S. Havlin	Visiting Scientist	LPS, DCRT
T. Delaney	Senior Investigator	ROB, NCI
M. Leon	Senior Investigator	CB, NHLBI

COOPERATING UNITS *(if any)*

LPS, DCRT; Department of Physics, Bar-Ilan University, Israel

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Many of the clinical research projects of the laser biophysics group involve the interaction of light with tissue (e.g., laser microsurgery, Laser Doppler blood flow measurements, photo dynamic therapy of cancer, noninvasive platelet assessment). In order to more fully quantitate these techniques, we have undertaken theoretical modeling of light propagation in biological tissues and turbid media.

Analytical equations have been devised characterizing various parameters of photons illuminating a tissue surface (probability of surface re-emission at a given distance, mean path before re-emission, mean depth of penetration, probability of absorption with depth). These expressions have been used to interpret empirical measurements on living tissues and to quantify better a variety of clinical measurements (e.g. Laser Doppler blood flow and volume measurements, dosimetry in PDT of cancer, and remote sensing of atherosclerotic plaque).

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10258-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Photochemical Inactivation of Virus and Bacteria in Blood

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. F. Bonner	Physicist	BEIB, DRS
K. N. Prodouz	Biologist	DBBP, FDA
J. C. Fratantoni	Section Chief	DBBP, FDA
A. Russo	Section Chief	ROB, FDA

COOPERATING UNITS *(if any)*

DBBP, FDA; ROB, FDA

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1	1	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project was initiated in the past year to quantitate photochemical destruction of virus in blood and blood products and the effects on the native blood components. Initial studies using an XeCl eximer laser characterized the response of virus and blood components as function of cumulative fluence and peak irradiance. Single and multiple photon photochemical schemes were investigated. Single photon photochemistry resulted in an efficacious treatment range between 10-20 J/cm^2 in which a hardy virus is inactivated and platelets and plasma proteins are minimally affected. Multiple photon effects at higher irradiance led to increased protein damage in blood components without increasing efficacy of viral inactivation. Augmentation of this therapeutic window by photochemistry using exogenous agents such a riboflavin is being investigated.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10259-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Visual Target Tracking-Ability Assessment System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

T. R. Clem, Sr. EEES, BEIB, DRS
D. W. Hommer, M.D. CNSB, NIMH

COOPERATING UNITS *(if any)*

CNSB, NIMH

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1	0.9	0.1

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

One of the major problems facing researchers in the area of neuropsychiatric disorders, such as schizophrenia and dementia of the Alzheimer's type (DAT) has been the lack of adequate animal models for these disorders. Without animal models any investigation into the pathophysiology of psychosis and dementia is extremely difficult. Since the symptoms of schizophrenia and DAT are primarily linguistic and cognitive, it is not surprising that animal models have not been developed for these disorders. However, there are non-linguistic methods which measure brain function related to cognition. Perhaps the most quantifiable and extensively studied (in both human and non-human primates) of these methods is the measurement of eye movements.

A variety of eye movement abnormalities have been identified in patients with schizophrenia, as well as in patients with DAT. The purpose of this project is to provide the clinical data on eye movement abnormalities in schizophrenia and DAT from which a non-human primate model could be developed. In order to do this it is essential that the eye movement tasks be simple and well characterized, and that the measurement of eye movement be highly quantifiable.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER: Z01 RS 10260-01 BEI

PERIOD COVERED
October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*
Real-Time High-Performance Confocal Laser Scanning Optical Microscope

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

S. Goldstein	Chief	MES, BEIB, DRS
M. Datiles	Clinical Branch	NEI

COOPERATING UNITS *(if any)*

LAB/BRANCH
Biomedical Engineering and Instrumentation

SECTION
Mechanical Engineering Section

INSTITUTE AND LOCATION
DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.5	0.5	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither
☐ (a1) Minors
☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A new type of confocal laser scanning optical microscope has been conceived that has the potential to generate video images at TV frame rates. This scanning rate is 100 times greater than that of conventional confocal microscopes, which employ mechanical scanning; yet the new instrument is expected to retain all of the advantages of conventional confocal microscopes. Initial use will involve optical sectioning of corneas. An anticipated application is low-level fluorescence microscopy. Major components are under construction and system integration and preliminary testing are planned for early 1988.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10261-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Elemental Mapping of Trypanosoma Cruzi by Analytical Electron Microscopy

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. D. Leapman	Visiting Scientist	BEIB, DRS
others:		
J. A. Dvorak	Biologist	LDP, NIAID
J. Engel	Visiting Scientist	LPD,NIAID
C. E. Fiori	Physical Scientist	BEIB, DRS
C. R. Swyt	Physical Scientist	BIEB, DRS

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electron Beam Imaging and Microspectroscopy Group

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.3	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Elemental analyses were obtained from two different clones of Trypanosoma Cruzi (a pathogenic protozoan causing Chagas' disease) that had previously been shown to have differences in their virulence and optical properties. The analyses was accomplished by means of elemental mapping in BEIB's computerized analytical electron microscope. Samples were prepared by rapidly freezing whole cells placed in an ammonium nitrate buffer and supported on formvar/carbon EM grids; samples were freeze-substituted prior to analysis. X-ray maps of Fe, Zn, Mg, K, Ca, P, and S were recorded from a number of epimastigotes from each clone . Different iron contents were established for the two cell types, one clone having approximately twice the Fe content of the other, with most appearing to be in the mitochondrial region and possibly attributable to cytochromes. Other differences were seen in the amounts of divalent cations (Mg, Ca and Zn), which were mainly bound with phosphate in dense bodies scattered throughout the cells.

GPO 914-918

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10262-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Hemodynamic Models for Catheter Studies

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

R. J. Lutz DRS, BEIB

Others:

R. L. Dedrick	DRS, BEIB	D. Miller	CC, DR
J. Collins	CC, CNS	J. Doppman	CC, DR
S. Saris	NINCDS, IR, SN	J. Tweed,	NINCDS, IR, SN
K. Van Boskirk	DRS, BEIB	M. Stout	DRS, BEIB

COOPERATING UNITS *(if any)*

NINCDS, CC

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Chemical Engineering Section

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
3.0	2.0	1.0

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Physical models of vascular systems have proven to be very useful tools for studying hemodynamic events that occur during the use of catheters. Our investigations with *in vitro* flow models have included (1) mixing studies in a hepatic model using a prototype balloon catheter that infused dye solutions through side holes proximal to the balloon at the rate of 1.4ml/min, (2) studies in a hepatic model that investigated the effect of infusion rates (in the range from 1ml/hour to 20 ml/min) on mixing from an end hole catheter placed in the gastroduodenal artery, (3) mixing studies in a carotid artery model during ultra-slow infusion (4ml/day) from an Infusaid pump, (4) investigation of a novel balloon catheter with a built-in ultrasonic, pulsed-Doppler crystal in the tip intended to monitor intra-lumenal flow rates, and (5) studies in large-vein flow models of the use of multilumen catheters during simultaneous infusions of incompatible drugs.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10263-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

A System for Quality Control of Activity of Injected Short-lived Radionuclides

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A. Markowitz	Electrical Engineer	ACES, BEIB, DRS
B. Chidakel	Electronic Technician	RIS, BEIB, DRS
M. Green	Physicist	NM, CC

COOPERATING UNITS *(if any)*

NM, CC

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.3	.2	.1

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

The amount of tracer administered to a patient during a diagnostic nuclear medicine procedure must be known accurately. A microcomputer-based system permits the dose contained in a syringe to be displayed continuously in the patient imaging area after a single calibration is performed in radiopharmacy. The system was designed for short-lived positron emitting isotopes used in Positron Emission Tomography (PET)

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10264-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Microfluorometer for On-Line Measurements of Intracellular pH

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A. Markowitz	Electronics Engineer	ACES, BEIB, DRS
B. Chidakel	Electronic Technician	BEIB, DRS
T. Tedder	Mechanical Technician	BEIB, DRS
L. Rosario	Biophysicist	LCBG, NIADDK

COOPERATING UNITS *(if any)*

LCBG, NIADDK

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
.55	.25	.3

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Measurements of intracellular pH in single collagenase-isolated islets preloaded with a fluorescent probe were performed. A microfluorescent pH probe was embedded into a pancreatic beta cell and monitored with a fluorescent microscope, fluorometer and data acquisition system.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10265-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Quantitative, On-Line Detection of Secreted ATP

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A. Markowitz	Electronic Engineer	ACES, BEIB,DRS
B. Chidakel	Electronic Technician	BEIB, DRS
T. Tedder	Mechanical Technician	BEIB, DRS
E. Rojas	Biophysicist	LBCG, NIADDK

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Applied Clinical Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.6	0.2	0.4

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A method to obtain quantitative real-time measurements of the kinetics of secretion of vesiclular contents by monitoring release of the hormone adenosine-5-triphosphate (ATP), using luciferase-catalyzed luminescent oxidation of luciferin.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10266-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

CGR Collaborative Project in Magnetic Resonance Imaging

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

A. F. LeRoy	Dir., San. Eng.	AM, BEIB, DRS
J. Doppman	Chief	DRD, CC
E. Glatstein	Chief	ROB, NCI
J. Decker	Director	CC, NIH
B. Chabner	Director	DCT, NCI
E. Becker	Assoc. Director	NIH

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Analytical Methods

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.4	

CHECK APPROPRIATE BOX(ES)

☒ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

This project was undertaken to develop a collaborative research program in Magnetic Resonance Imaging (MRI) between investigators at NIH and the Research Department of Thomson-CGR. CGR is providing a 0.5 T MRI scanner, (Magniscan 5000) as a gift to NIH and has entered into a formal agreement with NIH that governs the development of the research program.

The installation of the MRI system started in June 1987 in the NIH Clinical Center and is expected to be complete by September 1987

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10267-01 BEI

PERIOD COVERED

July 30, 1986 - July 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

A Low-Noise Electrometer for an Automated OEC Measurement System

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

H. E. Cascio	Electr. Eng.	BEIB, DRS
R. L. Berger	Physicist	LTD, NHLBI
J. M. Rifkind	Chief	IRP, NIA
K. O. Kalmbach	Eng. Tech.	LTD, NHLBI

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.8	0.4	0.4

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☒ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Measurement of the hemoglobin oxygen equilibrium curve (OEC) in an automated system is hampered by electronic noise. Reliable measurement of partial pressures with an accuracy of 0.001 mmHg requires special techniques in electronic circuit design. The pO_2 and the pCO_2 electrodes have very high internal resistance with very low output signal levels. When these devices are used in an environment contaminated by radiofrequency interference (RFI) from a computer, the magnetic fields of stepping motors, or power line transients generated by a high current water bath, the electrode output leads must be kept short and shielded. The electrode signals must be kept scaled and offset by a computer-controlled signal processor that interfaces these measured voltages properly to an AT-type personal computer, for further software analysis. Another task is design and fabricate the required circuitry for the development of the automated system to make the required measurements.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10268-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less. Title must fit on one line between the borders.)*

Electroporation Apparatus

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

W. S. Friauf	Chief, EEES	BEIB, DRS
G. Hemphill	Electronic Technician	BEIB, DRS
R. D. Astumian	Staff Fellow	LB, NHLBI
P. B. Chock	CH. Section MET. REG	LB, NHLBI
E. Tekle	Bio.Technician	LB, NHLBI

COOPERATING UNITS *(if any)*

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Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronic Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.4	0.2	0.2

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Apparatus has been developed for creating pores in cells by means of alternating high electrical field gradients. Use of alternations rather than static fields is expected to reduce cell damage. The apparatus has additional features to make it suitable for non-linear dielectric spectroscopy, an application that may help to develop new information about cell membranes.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10269-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(50 characters or less. Title must fit on one line between the borders.)*

Physiologic Study of High Altitude Sherpas at Their Homes

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

C. Gibson	Electronics Engineer	EEES, BEIB, DRS
D. Blume	Biologist	State College of LA.
R. Winslow	Director	Chief Lair, Presidio
	of San Franciscan	

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Electrical and Electronics Engineering

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
0.3	0.2	0.1

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☐ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

A set of equipment was assembled and shipped to Kunde, Nepal (alt. 13,600 ft) to do the following tests: physical examinations, sleep studies with staging, water balance studies, ANF studies, spirometry, complete blood counts (CBCs), blood viscosities, 2-3 DPGs, blood pH, osmotic fragilities, Hb, MethHb, COHb, oxygen equilibrium curves on whole blood, and a ramp and steady state exercise test using breath-by-breath analysis.

Thirty subjects living at high altitude (13,600 ft) were studied in 8 weeks and data analysis is now being done.

DEPARTMENT OF HEALTH AND HUMAN SERVICES - PUBLIC HEALTH SERVICE

NOTICE OF INTRAMURAL RESEARCH PROJECT

PROJECT NUMBER

Z01 RS 10270-01 BEI

PERIOD COVERED

October 1, 1986 - September 30, 1987

TITLE OF PROJECT *(80 characters or less Title must fit on one line between the borders.)*

Computer-Assisted Analysis of M-Mode Echocardiograms

PRINCIPAL INVESTIGATOR *(List other professional personnel below the Principal Investigator.) (Name, title, laboratory, and institute affiliation)*

M. Unser	Visiting Associate	BEIB, DRS
M. Eden	Chief	BEIB, DRS
G. Pelle	Chargé de recherche	Unité 138, INSERM
P. Brun	Chief	Unité 138, INSERM

COOPERATING UNITS *(if any)*

LAB/BRANCH

Biomedical Engineering and Instrumentation

SECTION

Office of the Chief

INSTITUTE AND LOCATION

DRS, National Institutes of Health, Bethesda, Maryland 20892

TOTAL MAN-YEARS:	PROFESSIONAL:	OTHER:
1.0	1.0	

CHECK APPROPRIATE BOX(ES)

☐ (a) Human subjects ☐ (b) Human tissues ☒ (c) Neither

☐ (a1) Minors

☐ (a2) Interviews

SUMMARY OF WORK *(Use standard unreduced type. Do not exceed the space provided.)*

Echocardiography is a non-invasive method for monitoring ventricular function and evaluating myocardial hypertrophy in patients with heart disease. Although the information displayed in two-dimensional echocardiograms is generally the most useful for diagnostic purposes, one-dimensional or M-Mode echocardiography, due to its greater reliability, is widely accepted as the reference method for the evaluation of myocardial wall thickness.

To facilitate quantitative assessment and to minimize potential errors, we have developed two computational approaches allowing the automated extraction of myocardial borders.

The first technique uses a set of predefined matched filters to enhance border characteristics. The extraction of cardiac boundaries is achieved by determining optimal paths along the time direction.

The second approach uses a radically different strategy. It computes an estimate of an elastic deformation (warping) function allowing the mapping of a measurement obtained at a